INCH-POUND

MIL-B-52088F
3 April 1992
SUPERSEDING
MIL-B-52088E(ME)
13 February 1978

MILITARY SPECIFICATION

BRIDGE, ARMORED-VEHICLE-LAUNCHED, SCISSORING-TYPE:

CLASS 60, ALUMINUM, 60-FOOT SPAN

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers a 63-foot, scissoring-type, armored-vehicle-launched bridge.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir, Research, Development, and Engineering Center, ATTN: STRBE-TSE, Fort Belvoir, VA 22060-5606 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 5420

SPECIFICATIONS

FEDERAL

UU-T-81	-	Tag, Shipping and Stock.
PPP-B-601	-	Boxes, Wood, Cleated-Plywood.
PPP-B-621	-	Boxes, Wood, Nailed and Lock-Corner.
PPP-B-1055	-	Barrier Material, Waterproofed, Flexible.
PPP-T-60	-	Tape: Packaging, Waterproof.

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MIL-P-116	-	Preservation, Methods of.
MIL-B-121	-	Barrier Material, Greaseproofed, Waterproofed, Flexible.
MIL-T-704	-	Treatment and Painting of Materiel.
MIL-C-3774	-	Crates, Wood; Open, 12,000- and 16,000 Pound Capacity.
MIL-C-46168	-	Coating, Aliphatic Polyurethane, Chemical Agent Resistant.
MIL-H-46170	-	Hydraulic Fluid Rust Inhibited, Fire Resistant Synthetic Hydrocarbon Base.
MIL-C-52464	-	Cylinder Assemblies, Actuating, Linear: Hydraulic, for Bridge and Bridge Launcher.
MIL-C-52950	-	Crates, Wood, Open and Covered.

STANDARDS

MILITARY

MIL-STD-105	-	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	-	Marking for Shipment and Storage.
MIL-STD-130	-	Identification Marking of US Military Property.
MIL-STD-781	-	Reliability Tests: Exponential Distribution.
MIL-STD-882	-	System Safety Program for Systems and Associated Subsystems and Equipment: Requirements for.
MIL-STD-889	-	Dissimilar Metals.
MIL-STD-1186	-	Cushioning, Anchoring, Bracing, Blocking, and Waterproofing; with Appropriate Test Methods.
MIL-STD-1472	-	Human Engineering Design Criteria for Military Systems, Equipment and Facilities.

FEDERAL

FED-STD-H28 - Screw Thread Standards.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government drawings. The following other Government drawings form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those in effect on the date of the solicitation.

DRAWINGS

ME

TA13211E7830 - Bridge, Armored Vehicle Launched, Scissoring Type; Class 60; Aluminum, 60-Foot Span.

(Copies of drawings required by contractors in connection with specific acquisition functions should be obtained from the USA Belvoir, Research, Development, and Engineering Center, ATTN: STRBE-JBS, Ft. Belvoir, VA 22060-5606.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

Boiler and Pressure Vessel Code, Section IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.

(Application for copies should be addressed to the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 3953 - Strapping, Flat Steel and Seals.
D 4675 - Selection and Use of Flat Strapping Material.

(Applications for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

AMERICAN WELDING SOCIETY, INC. (AWS)

D1.1 Structural Welding Code, - Steel.

(Application for copies should be addressed to the American Welding Society, 550 N.W. Le Jeune Road P.O. Box 351040, Miami, FL 33135.)

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION INC. (NMFTA)

National Motor Freight Classification Rules.

(Application for copies should be addressed to the American Trucking Association, Inc., ATTN: Traffic Order Section, 2200 Mill Rd., Alexandria, VA. 22314.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE Handbook.

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.)

UNIFORM CLASSIFICATION COMMITTEE (UCC)

Uniform Freight Classification Rules.

(Application for copies should be addressed to the Uniform Classification Committee, Rm 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, (except for related associated detail specifications, specification sheets or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. The bridge and bridge components, as specified (see 6.2), shall be in accordance with top assembly TA13211E7830, and as specified herein.

3.1.1 Drawings. The drawings forming a part of this specification are end product drawings. The contractor is responsible for preparing his own shop drawings. Where tolerances prescribed could cumulatively result in improper fits, the contractor shall provide tolerances within those prescribed on the

drawings to insure proper fit, assembly, and operation of the bridge. No deviation from the prescribed dimensions or tolerances is permissible without prior approval of the contracting officer. Any data (e.g., shop drawings, layouts, flow sheets, processing procedures, etc.) prepared by the contractor or obtained from a vendor to support fabrication and manufacture of the production item shall be made available, upon request, for inspection by the contracting officer or his designated representative.

3.2 First article. Unless otherwise specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.3.

3.3 Materials. Materials shall be as specified herein and as shown on the applicable drawings. Mechanical properties of heat-treated materials shown on the drawings shall be certified by mechanical test results which state actual mechanical properties of the material after heat treatment. All rubber parts shall be no more than 12 months old on date of acceptance by the Government.

3.4 Hydraulic system. All elements of the hydraulic system shall withstand a system working pressure of 3500 psi and a proof pressure of 7000 psi without external leakage (except weepage normally expected at the piston-rod packing) anywhere in the pressurized system, permanent deformation, or rupture of any part within the system. The threaded pipe joints shall be sealed with a commercial type sealant tape designed to withstand temperatures from -65 °F to +200 °F. The tape shall allow the joints to be disassembled for maintenance. All hydraulic lines and components shall be free from any foreign matter, such as metal chips and filings, that will not pass through a 150-mesh screen or any other foreign matter that may in any way contaminate the hydraulic fluid or damage the system.

3.4.1 Materiel deterioration prevention and control. The item(s) shall be fabricated from compatible materials, inherently corrosion resistant or treated to provide protection against the various forms of corrosion and deterioration that may be encountered in any of the applicable operation and storage environments to which the item may be exposed.

3.4.1.1 Dissimilar metals. Dissimilar metals shall not be used in intimate contact with each other unless protected against galvanic corrosion. Dissimilar metals and methods of protection are defined and detailed in MIL-STD-889.

3.4.1.2 Identification of materials and finishes. The contractor shall identify the specific material, material finish or treatment for use with component and subcomponent, and shall make information available upon request to the contracting officer or his representative.

3.4.1.3 Recovered materials. For the purpose of this requirement, recovered materials are those materials which have been collected from solid waste and reprocessed to become a source of raw materials, as distinguished form virgin raw materials. The components, pieces and parts incorporated in the armored-vehicle-launched bridge may be newly fabricated from recovered

materials to the maximum extent practicable, provided the armored-vehicle-launched bridge produced meets all other requirements of this specification. Used, rebuilt or remanufactured components, pieces and parts shall not be incorporated in the armored-vehicle-launched bridge.

3.5 Hydraulic hose assemblies. Hydraulic hose assemblies shall consist of a length of hydraulic hose as shown on the drawings and fittings conforming to SAE, 37-degree, flared-type swivel fittings of a permanent or reusable type. Hydraulic hose shall consist of a seamless compounded inner tube, reinforcement, and cover. The inner tube shall be compatible with hydraulic fluid conforming to MIL-H-46170, type 1. The reinforcement shall consist of wire braid(s) or spiral plies of high-tensile steel wire or a combination of both and shall be capable of withstanding the burst, proof, working, and impulse pressures specified herein. The outer cover of the hose shall be oil-, weather-, and abrasion-resistant synthetic rubber. The hose shall withstand storage at temperatures from -65 °F to +155 °F and for use at temperatures from 25 °F to +200 °F. The hydraulic hose shall have the following characteristics:

Working pressure (psi)	3,500
Proof pressure (psi, min)	7,000
Burst pressure (psi, min)	12,000
Bend radius (inches, min)	9-1/2
Impulse operating pressure psi)	3,500

The hose shall be marked with the size, number, and date of manufacture in quarter of year and year. In lieu of metal stamping the hose assembly guard, an aluminum or steel sleeve 0.050 ±.005 inch thick installed over the guard and contained by the hose fittings could be provided for the metal stamping identification. The sleeve shall be a continuous band without mechanical joints. The hose age shall be not greater than 6 quarters (maximum accumulated age) from date of cure to the date of presentation for acceptance. The hydraulic hose assembly shall withstand pressure surges of 5000 psi at a rate of 35 surges per minute for not less than 35,000 impulse cycles without leakage, bursting, or coupling blowoff. The average of the impulse cycles for four hose assemblies shall be greater than 50,000. All hose assemblies (i.e. after hose and fittings are joined together) shall withstand a working pressure of 3500 psi and a proof pressure of 7000 psi without any external leakage. When hose assemblies are procured separately, the end openings or threads shall be protected with suitable plastic protectors.

3.6 Scissoring cylinder. The scissoring cylinder shall conform to MIL-C-52464 (see 6.4).

3.7 Scissoring cables.

3.7.1 Socket positioning. The relative position of the sockets shall be as shown on the drawings when the wire rope assembly is under a tensile load of 60,000 pounds. The entire length of the wire rope shall be painted with a continuous, longitudinal, color strip after prestressing and before the time

the rope is being measured to length and being marked for fittings. The rope shall be under the tensile load of 60,000 pounds at time of stripping. The colored strip shall be made of fast-drying lacquer or enamel and shall be placed on the rope by an automatic stripping machine. The relative position of the sockets as shown on the drawings shall be aligned with the painted strip. If another method for the determination of the relative position of the sockets is used other than the continuous painted strip, the contractor must obtain approval of the procedure from the contracting officer.

3.7.2 Socketing. Socketing of wire rope for scissoring cables shall be accomplished as follows:

a. The wire shall be securely seized for several inches before cutting and securely wrapped with a seizing iron to prevent untwisting of the rope and insure equal tension in the strands when load is applied.
b. The end seizing on the wire rope shall be taken off, leaving the additional seizing at a distance from the end equal to the length of the socket basket. When present, the fiber core shall be cut back to this seizing, and the wires shall be untwisted and "broomed out", although they need not be straightened.
c. The wires, for the distance that they are to be inserted in the socket, shall be carefully cleaned with naphtha or gasoline. The wires, for a distance not more than 3/4 of the cleaned length, shall then be dipped in commercial muriatic acid for 30 seconds to 1 minute or until the acid has thoroughly cleaned each wire. Care should be taken that the acid does not come in contact with any other portion of the rope.
d. The wires shall then be dipped in boiling water.
e. The wires shall then be inserted in the basket of the socket. Care shall be taken to insure that the socket is in line with the axis of the wire rope.
f. The base of the socket shall be sealed with putty, clay, or similar substance.
g. The basket shall be filled with molten zinc. The temperature of the molten zinc shall not exceed approximately 830 °F to avoid annealing the wires.
h. Cable lubricant shall be applied to the cable near the sockets after cooling.

3.8 Threads. All threads not otherwise covered by item specifications shall conform to FED-STD-H28. Exposed portions of all piston-rod threads shall be covered with a threaded steel sleeve thread protector when cylinders are shipped without clevis attached to rod.

3.9 Identification marking. The bridge and bridge components shall be identified in accordance with MIL-STD-130 and the markings indicated on the drawings.

3.9.1 Metal stamping. The metal stamping of components as shown on the drawings shall be of sufficient penetration to be legible after painting.

3.9.2 Stenciling. In addition to the metal stamping, the nomenclature, National Stock Number, weight and cubage shall be stenciled on each bridge component, except pins and the scissoring cables, near the metal stamping. The letters "NET WT" shall precede the numerals in the weight, and the "CU" shall precede the cubic displacement. Marking shall be Gothic-type capitals and Arabic numerals 1 inch high for end and center panel assemblies and 1/2 inch high for all other components. Stenciling shall conform to MIL-T-704.

3.9.3 Tags. A cloth tag conforming to UU-T-81, type A, shall be wired, in a conspicuous location, to each hydraulic cylinder, ramp section, center section, and separate hose and pipe assemblies. The wire shall be corrosion resistant. The following information will be printed on the tag with waterproof ink: "THIS BRIDGE EQUIPPED WITH MIL-H-46170, TYPE 1 (FRH OIL), USE ONLY WITH COMPATIBLE LAUNCHER."

3.10 Treatment and painting. All parts of the bridge shall be cleaned, treated, and painted in accordance with MIL-T-704, type F, for use on ferrous metals and type G for use on non-ferrous metals, except the finish coat shall be forest green conforming to MIL-C-46168 and as specified herein. Contact surfaces of all steel to aluminum connections (whether welded or hot riveted) shall be treated and painted with a suitable pretreatment primer coating followed by a primer coating followed by a primer coating with a dry film minimum thickness of 1 mil each before assembling.

3.11 Government-loaned property. Unless otherwise specified (see 6.2), the following property in the quantities indicated will be loaned by the Government (see 6.5):

Item no.	Quantity	Description	Identification
1	1 set	Inspection equipment for bridge	Quality Assurance Pamphlet AMSME-FB-P715-105
2	As required for IPT	Launcher, M60A1, M48A5, or M48A2 tank chassis transporting: For bridge, -armored-vehicle-launched, scissoring type, class 60	NSN: 5420-00-889-2020-M60A1 5420-00-542 3052-M48A2 5420-01-076 -6096-M48A5

3.12 Reliability. The specified mean-time-between-failure (θ_o) shall be 100 cycles when tested in accordance with MIL-STD-781, as specified in 4.6.1.

3.13 Maintenance ratio. The ratio of man-hours of maintenance required to the hours of operation performed shall not exceed 0.06.

3.14 Safety and human factors.

3.14.1 Safety. Within the limits of prescribed design specifications, operation and maintenance of the bridge or components shall not create hazard levels greater than category IV - negligible as defined in MIL-STD-882.

3.15 Workmanship.

3.15.1 Steel fabrication. Steel used in the fabrication of the bridge shall be free from lamination, kinks, and sharp bends. Corners shall be square and true. All burrs and rough edges shall be removed. All bends shall be made to a radius which will not cause cracking at the extreme outer fibers of the piece being bent, and all bends except for minor details shall be made by the use of metal dies or fixtures to insure uniformity of size and shape. Shearing, chipping, and flame cutting shall be done neatly and accurately. Prior to flame cutting of high strength steels, the contractor shall prepare a flame-cutting procedure. This procedure, submitted in duplicate, shall be subject to the approval of the contracting officer.

3.15.2 Aluminum fabrication. The straightening of aluminum shall be done by methods that will not cause injury to the metal. Care shall be used in handling aluminum during fabrication to avoid scratching or damage to edges. All bends of a major character shall be made with metal dies or fixtures to insure uniformity of size and shape. Sharp instruments shall not be used for marking bend lines. Aluminum sheets less than 3/8-inch thick may be cut by shearing. Sheets 3/8 inch and over in thickness shall be cut by routing or sawing. Aluminum shall not be cut by methods using heat. All burrs and rough edges shall be removed. Re-entrant cuts that cannot be made by shearing may be made by the use of a rectangular punch or a router.

3.15.3 Bolted connections. Bolt holes shall be accurately made and shall have all burrs removed. All fasteners shall be securely tightened.

3.15.4 Rivet holes. Dimensions for punching rivet holes in aluminum prior to assembly, reaming after assembly, or drilling shall be in accordance with table 1, except that holes may be drilled after assembly in the solid metal to the finished diameters specified on the drawings. Holes for the manufactured countersunk head rivets or driven countersunk heads shall be of such depth and angle that the heads shall fill the hole without projecting or recessing.

TABLE I. Dimensions for punching, reaming, or drilling after assembly rivet holes.

Nominal rivet diameter (inch)	Maximum size of punched holes (inch)	Size of reamed or drilled holes (inch)
1/2	3/8	.521 .541
3/4	5/8	.771 .791

3.15.5 Riveting. Components shall be bolted in position before riveting. Suitable jigs and fixtures shall be used to maintain alignment and tolerance. The types of manufactured rivets to be used shall be as specified in the list of materials on the drawings. The driven or formed rivet heads shall be of cone point or countersunk type as specified on the drawings. Where the list of materials specifies a manufactured CSK HD RIVET, the structural symbol ## (CSK Near Side) or # (CSK Far Side) on the component details on the main field of the drawing designates the orientation of the manufactured CSK HD. On drawings containing parts that require rivets to be countersunk on both sides, the structural symbol 0 (CSK both sides) is used on the component details, and the orientation of the manufactured CSK HD of the rivet is at the option of the contractor. Rivets shall fill the holes in the joined members. Caulking or redriving of rivet heads shall not be permitted. Rivet tension shall not be created by driving-in incorrectly fitted members. See appendix for riveting workmanship requirements. Defective rivets which fall under criteria shown in appendix shall be removed without injury to the joined metal. Aluminum rivets shall not be heated in excess of 975 °F and shall be driven at a temperature of not less than 850 °F.

3.15.6 Welders and welding.

3.15.6.1 Welders and welding operators. Before assigning any welder or welding operator to manual welding work covered by this specification, the contractor shall obtain certification that the welder or welding operator has passed qualification tests as prescribed by either AWS D 1.1 or the ASME code for the materials joined and the type of welding operation to be performed and that such qualification is effective as defined. Contractors who only make horizontal welds need not qualify welders for "all position welding." The contractor is responsible for determining that automatic welding equipment operators are capable of producing quality welds in accordance with AWS and ASME codes. In the event of evidence of poor welds, the Government reserves the right to require retesting of any welder or welding operator (see 6.7).

3.15.6.2 Welding. The surfaces of parts to be welded shall be free from scale, paint, grease, and other foreign matter. Welds shall transmit stress without permanent deformation or failure when the parts connected by the welds

are subjected to proof and service loadings. Welding shall be done by the shielded, tungsten-arc and gas metal-arc methods in accordance with applicable requirements of either ASME or AWS code. Where embrittlement of the joined metal may result, preheating or annealing or both shall be employed. All welded parts shall be free from cracks and other imperfections that may reduce the effectiveness of the part. Work shall be positioned for flat welding whenever practicable.

3.15.7 Jigs and fixtures. Shop-fabricated components (except minor parts) shall he assembled in steel jigs or frames and joined while held in position. Jigs or frames shall be designed to minimize distortion. Steel jigs or templates shall be used for drilling or boring all field-connected pin or bolt holes. The length of the cylinder connector cables shall be measured in a jig. Quick disconnect sockets (female couplings) shall be equipped with a dust cap chained to fitting.

3.15.8 Interchangeability. All like components shall be interchangeable with respect to installation, performance, and quality.

3.15.9 Assembly and hydraulic performance. The bridge shall be fabricated to assure ease of assembly and fit. When the bridge is assembled, all components shall be present and clean, and the assembly shall be made without distortion or forcing together any components. Hydraulic connections shall not leak.

3.16 Human Factors Engineering. The bridge and components shall comply with the design criteria of MIL-STD-1472. Special design emphasis shall be given, but not limited to, MIL-STD-1472, paragraph 4 (General Requirements), 5.5 (Labeling), 5.9 (Design for Maintainer), and 5.13 (Hazards and Safety), as applicable.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with

all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.2 Parts and components. Parts and components detailed on the drawings shall be inspected in accordance with the quality assurance provisions (QAP) shown on the drawings. Evidence that any part or component does not comply with the applicable drawings shall be cause for rejection of that part or component. The drawings specify the characteristics requiring QAP inspection, the sampling plan, and the basis for acceptance and rejection (see 6.6 and 6.8.1).

4.1.3 Inspection equipment. Special final inspection equipment to be loaned to the contractor by the Government (see 6.5) is identified in the quality assurance pamphlet included in the TA package (see 3.1).

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.3).
b. Quality conformance inspection (see 4.4).
c. Inspection of packaging (see 4.7).

4.3 First article inspection.

4.3.1 Examination. The bridge or bridge component shall be examined as specified in 4.5.1. Presence of one or more defects shall be cause for rejection.

4.3.2 Tests. The bridge or bridge component shall be tested as specified in 4.5.2.1 through 4.5.2.5 as applicable. Failure of any test shall be cause for performing the inspection specified in 4.1.2.

4.4 Quality conformance inspection.

4.4.1 Examination. Each bridge or bridge component shall be examined as specified in 4.5.1. Presence of one or more defects shall be cause for rejection.

4.4.2 Tests. Each bridge or bridge component shall be tested as specified in 4.5.2.4. Failure of the test shall be cause for rejection.

4.5 Inspection procedure.

4.5.1 Examination. Unless otherwise specified (see 3.11), Government-loaned inspection equipment shall be used in accordance with the QA Pamphlet included in the TA package (see 3.1) to inspect dimensions indicated on the

applicable drawings. The bridge or bridge components shall be examined as specified herein for the following defects:

101. Any part or component not in accordance with the QAP requirements as shown on the drawings (see 3.1.1).
102. Any dimension other than those identified on the QAP requirements shown on the drawings not as specified (see 3.1.1).
103. Treatment and painting not as specified (see 3.10).
104. Members not true to dimension and line, containing twists, bends, or other imperfections. Holes not cylindrical, out of position, incorrect size, roughly finished, or containing burrs (see 3.15.4).
105. Weld defects such as base metal cracks adjacent to or behind welds, cracks in weld metal, undercutting of base metal, lack of fusion with parent metal or between parts, porosity, lack of penetration, lack of prescribed fit, slag inclusion or spatter, or incorrect size (see 3.15.5).
106. Welders and welding operators not qualified as specified (see 3.15.6.1).
107. Welding and welds not as specified procedure (see 3.15.6.2).
108. Material not as specified (see 3.3).
109. Materials are not resistant to corrosion or deterioration or treated to be made resistant to corrosion or deterioration for the applicable storage and operating environment as specified (see 3.4.1).
110. Dissimilar metals as specified in MIL-STD-889 are not effectively insulated from each other as specified (see 3.4.1.1).
111. Contractor does not have documentation available for identification of material, material finishes, or treatments (see 3.4.1.2).
112. Lubrication fittings not as specified on the drawings (see 3.15.9).
113. Leaks in the hydraulic fluid system (see 3.15.9).
114. All like, commercial components furnished by the contractor not directly interchangeable with respect to installation, performance, and quality (see 3.15.8).
115. Bolted connections not as specified (see 3.15.3).
116. Identification marking and hose assembly identification missing or incorrect (see 3.9, 3.9.1 and 3.9.3).
117. Quick-disconnect sockets (female couplings) not equipped with dust cap chained to fitting (see 3.15.7).
118. Age of hose not as specified (see 3.5).
119. Components missing or not as specified (see 3.1.1).
120. Stenciling not as specified (see 3.9.2).
121. Each hose assembly not assembled correctly, tested, or fitted with flat armor spring guards as specified (see 3.15.9).
122. Mechanical properties of heat-treated materials not certified after heat treatment (see 3.5).
123. Scissoring cables not as specified (see 3.7.1).
124. Workmanship not as specified (see 3.15.1 and 3.15.2).
125. Socketing not as specified (see 3.7.2).
126. Human Factors Engineering not as specified (see 3.16).

4.5.2 Tests.

4.5.2.1 Test conditions. Unless otherwise specified herein, conduct all tests at an ambient temperature of from +40 °F to +90 °F and an oil temperature of from +40 °F to +150 °F at the pump discharge. Unless otherwise specified herein, use oil conforming to MIL-H-46170, type 1. All tests shall be conducted in the order listed.

4.5.2.2 Hose impulse fatigue. Take four 39-inch specimens of hose from the coil of hose used in the fabrication of the preproduction model hose assemblies. Fabricate four hose assemblies from these specimens using the fittings specified herein and test the hose assemblies for impulse fatigue. Subject each test hose assembly to a 7000 psi static proof pressure for a 3- to 5-minute period prior to any aging. Evidence of hose or fitting leakage shall constitute failure of this portion of this test. Artificially age the four hose assemblies by inserting oil into the inside bore of the hose and plugging the ends. Exclude all air from the inside of the hose assemblies during the aging process. Place the four hose assemblies in a container for 7 days at a temperature maintained at 158 °F ±2 °F. Pressure due to oil expansion may be relieved. After aging, again subject each hose assembly to the 7000 psi proof pressure for 3 to 5 minutes. Evidence of hose or fitting leakage shall constitute failure of this portion of this test. Connect each of the four hose assemblies to a manifold installed in a testing machine which produces dynamic pressure impulses with peak pressures of 5000 psi at a frequency of one peak impulse per cycle and 35 cycles per minute. Use electronic measuring devices to measure and indicate the impulse pressures. Hold the oil (conforming to MIL-H-46170, type 1, diluted with up to 20 percent aircraft lubricating oil if desired) to a temperature of 120 °F ±20 °F measured in the manifold. Bend the hose assemblies to the minimum bending radius of 9-1/2 inches during the impulse fatigue test. When the four hose assembly impulse cycles are averaged, the maximum individual number of cycles that are used to compute the average shall be greater than 50,000 cycles. Leakage, bursting, or coupling blowoff shall constitute failure of this test.

4.5.2.3 Hydraulic hose assembly proof pressure. All hose assemblies not tested in the hydraulic system test specified in 4.5.2.4 shall be subjected to a static proof pressure of 7000 psi for 2-to 5 minutes. Evidence of rupture, permanent deformation, external leakage, or nonconformance to 3.5 shall constitute failure of this test.

4.5.2.4 Hydraulic rigid plumbing. Clean and flush all hydraulic lines in the bridge sections so as to be free from any foreign matter such as metal chips and filings. For sections which do not contain a tee (male center section and female ramp sections), connect the discharge port of a hydraulic pump having a capacity of not less than 30 gpm to one end of the hydraulic piping in the bridge section. Insert a hydraulic filter equipped with a removable 150-mesh screen in the hydraulic return line leading from the hydraulic piping at the opposite end of the bridge section to the hydraulic reservoir of the pump. The hydraulic circuit, so established, shall permit fluid to flow from the pump through the piping in the bridge section and pass

through a filter to return to the reservoir. After the hydraulic fluid has been allowed to flow through the circuit at a rate of 30 gpm for not less than 5 minutes, disconnect and disassemble the filter. Presence of foreign particles on the filter screen shall constitute failure of this portion of this test. For sections containing tees such as the female center sections and male ramp section, proceed as specified above. In addition, after the fluid has flowed for not less than 10 minutes from one end of the section to the other, remove the return line from the end of the piping and connect it to the end of the pipe coming out of the tee. Plug the end of the pipe where the return line was previously attached. Set the pump in operation and let the fluid flow for not less than 5 minutes through the revised circuit. At the completion of the test, disassemble the filter. Presence of foreign particles on the filter screen shall constitute failure of this portion of the test. Increase the pressure within the system to 7000 psi and maintain it while the complete hydraulic system of the bridge section is examined. Nonconformance to 3.5 shall constitute failure of this test.

4.5.2.5 Assembly and hydraulic system. Assemble the bridge components into a complete bridge and place the bridge on cribbing. During assembly of the bridge for test of the hydraulic system, examine the bridge for fit and ease of assembly. Clean and flush all hydraulic components including flexible and rigid lines, valves, and cylinders prior to installation in the bridge sections so as to be free from any foreign matter such as metal chips and filings. Disconnect the hydraulic hoses from the rod- and cap-end ports of the hose lines. Connect a length of hydraulic hose to the two quick-disconnect fittings on the launching diaphragm at the far end of the bridge to permit free passage of fluid from one fitting to the other. Connect the discharge port of a hydraulic pump having a capacity of not less than 30 gpm to a quick-disconnect fitting on the launching diaphragm located at the near end of the bridge. Insert a hydraulic filter equipped with a removable 150-mesh screen in the hydraulic return line leading from the second quick-disconnect fitting at the near end of the bridge to the hydraulic reservoir of the pump. The hydraulic circuit so established shall permit fluid to flow from the pump through most of the piping and hose lines in the bridge and pass through a filter to return to the reservoir. After the hydraulic fluid has been allowed to flow through the circuit at a rate of 30 gpm for not less than 10 minutes, remove the hydraulic hose linking the two quick-disconnect fittings at the far end of the bridge. Remove the plugs previously installed in the scissoring cylinder hose lines. Install and connect a hose assembly between the two ends of the scissoring cylinder hoses in such a manner as to permit high pressure fluid to flow through the connection without leakage. Set the pump in operation and permit the fluid to flow through the revised circuit for not less than 10 minutes. At the completion of the test, disassemble the filter. Presence of foreign particles on the filter screen shall constitute failure of this portion of this test. This test does not relieve the contractor of the requirement to flush all hydraulic components prior to installation in the bridge sections. Disconnect the scissoring cylinder cables from the scissoring cylinder. Connect an external hydraulic pump capable of generating 7000 psi to the hydraulic system of the bridge. Utilize the quick disconnect fittings located at the launching diaphragm to

connect the hydraulic power unit to the bridge. Cycle the hydraulic scissoring cylinder with the piston unrestrained through not less than five cycles to demonstrate satisfactory operation and adjustment. Then increase the pressure within the system to 7000 psi and maintain it while the complete hydraulic system of the bridge is examined. Difficulties in the assembly or fit of the bridge components in the bridge or nonconformance to 3.5 shall constitute failure of this test.

4.6 First article performance.

4.6.1 Reliability. Using the MTBF specified in 3.12, first article production testing shall be conducted in accordance with test plan 30-5 of MIL-STD-781. Testing shall continue until an "accept" or "reject" decision is reached in accordance with the test plan. Testing shall be conducted in cycles, each cycle consisting of not less than 1 mile transport on a launcher; launch; traffic density of 15 vehicles, at least five of which are class 60; and recovery. For purposes of this test, a failure is defined as any random malfunction which causes or may cause:

a. Failure to commence operation, cessation of operation, degradation of the performance capability of the bridge below design levels.
b. Serious damage to the bridge by continued operation.
c. Safety hazards by continued operation. Simultaneous related malfunctions are considered as one failure. Bridge failures resulting from malfunctions of the launcher shall be excluded.

4.6.2 Maintenance evaluation. The ratio of all the man-hours of maintenance required to the hours of operation performed during first article production reliability testing shall be computed. Nonconformance to 3.13 shall constitute failure of this test.

4.7 Inspection of packaging.

4.7.1 First article pack inspection.

4.7.1.1 Examination. Examine the first article pack for the defects specified in 4.7.2.3. Presence of one or more defects shall be cause for rejection.

4.7.1.2 Test. The first article pack of crated or boxed components for level A or B shall be subjected to the rail-impact test in accordance with MIL-STD-1186, appendix A. At the conclusion of the test, the first article pack shall be examined in accordance with the failure criteria of MIL-STD-1186; any non-compliance shall be cause for rejection of the pack.

4.7.2 Quality conformance inspection of pack.

4.7.2.1 Unit of product. For the purpose of inspection, a completed pack prepared for shipment shall be considered a unit of product.

4.7.2.2 Sampling. Sampling for examination shall be in accordance with MIL-STD-105. Sample size shall be determined by using MIL-STD-105, table I and table IIa. A lot shall be accepted when zero defects are found and rejected when one or more defects are found.

4.7.2.3 Examination. Samples selected in accordance with 4.7.2.2 shall be examined for the following defects. Presence of one or more defects shall be cause for rejection.

127. The bridge not disassembled as specified.
128. Surfaces requiring a contact preservative in accordance with the referenced document not coated with preservative for level A (see 5.2.1.1).
129. Hydraulic scissoring cylinder not fully charged with the specified hydraulic fluid for level A or C (see 5.2.1.1.4 and 5.2.2).
130. Exposed threads of piston rods not protected with threaded metal thread protectors for level A or C (see 5.2.1.1.4 and 5.2.2).
131. Exposed portions of piston rods not preserved, wrapped, or covered and the wrap secured as specified for level A (see 5.2.1.1.4 and 5.2.2).
132. Dust caps not installed for level A or C (see 5.2.1.1.5 and 5.2.2).
133. Loose hose not coiled and wrapped and the wrap secured as specified for level A (see 5.2.1.1.5).
134. Lateral braces not bundled and secured as specified for level A (see 5.2.1.1.6).
135. Equalizer plates not bundled and secured as specified for level A (see 5.2.1.1.7).
136. Cable beam and cylinder beam not bundled and secured as specified for level A (see 5.2.1.1.8).
137. Curb sections not bundled and secured or secured to the respective treadway section for which intended as specified for level A (see 5.2.1.1.9).
138. Consolidation not as specified for level A (see 5.2.1.1.10).
139. Components of unlike description bundled or consolidated together when bridge components are procured individually for level A (see 5.2.1.1.10.1).
140. Blocking, bracing, and anchoring not in accordance with the referenced document for level A or B (see 5.2.1.1.10.1 and 5.3.2).
141. The complete bridge procured not packed together in a crate, and center ramp sections and the bundled components of bridge not shipped as loose item as specified for level A or level B (see 5.3.1.1 and 5.3.2).
142. Bridge components procured individually not packed as specified for level A or B (see 5.3.1.2 and 5.3.2).
143. Strapping not as specified for level A or B (see 5.3.1.2 and 5.3.2).
144. Marking missing, illegible, incorrect, or incomplete for level A, B, or C (see 5.4).

5. PACKAGING

5.1 First article pack. The contractor shall furnish a first article pack for examination and test within the time frame specified (see 6.2), to prove prior to starting production packaging that the applied preservation, packing, and marking comply with the packaging requirements of this specification. Examination and test shall be as specified in section 4 and shall be subject to surveillance and approval by the Government (see 6.9). The first article pack may be accomplished utilizing either the first article model or a production model. When the first article model is utilized, any preservation and packing shall be removed by the contractor at no expense to the Government, when requested by the Government to facilitate comparison between the first article model and the production model.

5.2 Preservation. Preservation shall be level A or C as specified (see 6.2).

5.2.1 Level A.

5.2.1.1 Complete bridge procurement. When a complete bridge is procured, preservation shall be as follows.

5.2.1.1.1 Disassembly. The bridge shall be disassembled into the minimum various sections and components necessary to accomplish the preservation, and packing specified herein. Removed bolts, nuts, pins, and washers shall be placed in mating parts and secured to prevent their loss or consolidated as specified in 5.2.1.1.10.

5.2.1.1.2 Preservatives. Preservatives specified herein shall conform to the applicable specifications listed in and shall be applied in accordance with MIL-P-116.

5.2.1.1.3 Unprotected surfaces. Unpainted surfaces of bolts, nuts, washers, pins, holddown chains, turnbuckles, and any other surfaces requiring the application of a contact preservative in accordance with MIL-P-116, not definitely specified herein, shall be coated with type P-1 preservative.

5.2.1.1.4 Hydraulic scissoring cylinder. The piston shall be retracted into the cylinder as far as the linkage will permit and shall be secured to prevent movement. The exposed portions of the piston rods shall be coated with type P-6 preservative and wrapped or covered with barrier material conforming to MIL-B-121, type I, grade A, class 2, extending the wrap approximately 2 inches on the cylinder head. The wrap shall be secured in place with tape conforming to PPP-T-60, type IV. Any other metal surfaces of components of the system requiring a preservative in accordance with MIL-P-116 shall be coated with type P-1 preservative. All cylinders shall be shipped fully charged with hydraulic fluid conforming to MIL-H-46170, type 1. Metal plugs shall be used in all oil ports. Pins and pin holes shall be coated with type P-1 preservative. Exposed threads of piston rods shall be protected with threaded metal thread protectors.

5.2.1.1.5 Hydraulic hose. The hydraulic hose dust caps shall be installed. Each loose hose shall be coiled to the minimum safe diameter and wrapped with paper conforming to PPP-B-1055, class C-1. The wrap shall be secured with tape conforming to PPP-T-60, type IV.

5.2.1.1.6 Lateral braces. The lateral braces shall be bundled together and secured with not less than three, equally spaced straps in accordance with ASTM D 3953, type 1 or 2, zinc-coated, size as applicable and ASTM D 4675.

5.2.1.1.7 Equalizer plates. The cylinder-end equalizer plates and the fixed-end equalizer plates shall be bundled together and secured with not less than two, equally spaced straps that shall be in accordance with ASTM D 3953, type 1 or 2, zinc-coated, size as applicable and ASTM D 4675.

5.2.1.1.8 Cable beam and cylinder beam. The cable beam and cylinder beam shall be bundled together as specified in 5.2.1.1.7 or secured together by bolting through the alignment holes in the beams. After the bolts and nuts are tightened, they shall be coated with type P-1 preservative.

5.2.1.1.9 Curb sections. The curb sections of like description shall be bundled together in one bundle and secured with not less than three, evenly spaced straps that shall be in accordance with ASTM D 3953, type 1 or 2, zinc-coated, size as applicable and ASTM D 4675. The bundles of curb sections shall then be bundled together with not less than three straps specified herein. Wood blocking or battens, as required, shall be used in combination with strapping to form nonshifting bundles. The strapping shall be stapled to wood blocking or battens provided. As an alternate, the curb sections shall be secured to the respective treadway section for which intended.

5.2.1.1.10 Consolidation.

5.2.1.1.10.1 Component items. The hydraulic hose, bolts, nuts, washers, pins, turnbuckles, holddown chains, cables, and cylinder seat beams shall be consolidated together in close-fitting boxes conforming to PPP-B-621, class 2, style optional, or in boxes conforming to PPP-B-601, overseas type, grade B, style optional. Blocking, bracing, and anchoring of the contents to prevent movement and damage in accordance with MIL-STD-1186 shall be provided. Box closure shall be in accordance with the appendix to the applicable box specification. Strapping shall not be required.

5.2.1.1.10.2 Center-section braces and ramp-section braces. The braces shall be consolidated together as specified in 5.2.1.1.10.1.

5.2.1.2 Bridge components procured individually. When bridge components are procured individually they shall be preserved as specified in 5.2.1.1 except only components of like description and in the quantities specified (see 6.2) shall be bundled or consolidated together.

5.2.2 Level C. The components of the bridge shall be preserved in a manner to afford protection against deterioration and damage during shipment from the

contractor to the initial destination. Additionally all hydraulic cylinders shall be shipped fully charged with hydraulic fluid conforming to MIL-H-46170, type 1, and dust caps shall be placed on all hydraulic hoses.

5.3 Packing. Packing shall be level A, level B, or level C as specified (see 6.2).

5.3.1 Level A.

5.3.1.1 Complete bridge procurement. When a complete bridge is procured, packing shall be as follows:

a. The hydraulic scissoring cylinder, quadrant, bundled equalizer plates, launching diaphragm, lateral braces, and the consolidated containers shall be packed together in an open wood crate conforming to MIL-C-52950, style A, type V, non-demountable, or in an open wood crate conforming to MIL-C-3774, nailed assembly, skid-type base, as applicable. Blocking, bracing, and anchoring shall be in accordance with MIL-STD-1186 and the appendix to the applicable crate specification. Crates shall be closed type 1 or 2, size as applicable in accordance with ASTM D 3953 and D 4675. Strapping shall be zinc-coated.
b. The center sections, ramp sections, and the bundled components of the bridge (except the lateral braces, see a.) shall be shipped as loose items or in bundles, as applicable, without overpacking.

5.3.1.2 Bridge components procured individually. When bridge components are procured individually, they shall be packed as follows:

a. The center sections, ramp sections, and the bundled curb section and cable beam and cylinder beam shall be shipped as loose items or bundles, as applicable, without overpacking.
b. Components that have been consolidated as specified in 5.2.1.1,10 shall not require additional packing but shall be strapped with zinc-coated strapping as required in the appendix to the applicable box specification.
c. The hydraulic scissoring cylinder, quadrant, bundled, equalizer plates, launching diaphragm, and the lateral braces shall be packed in close-fitting boxes conforming to PPP-B-621, class 2, style optional or PPP-B-601, overseas type, grade B, style optional, in quantities not to exceed the weight limitation of the container. Box closure and strapping shall be in accordance with the appendix to the applicable box specification.

5.3.2 Level B. Packing shall be as specified in 5.3.1 for level A except boxes shall be domestic type or class as applicable, and strapping for bundles and boxes will not be required to be zinc-coated.

5.3.3 Level C. The components of the bridge shall be packed in a manner to assure carrier acceptance and safe delivery to destination at lowest ratings

in compliance with Uniform Freight Classification rules or National Motor Freight Classification rules.

5.4 Marking.

5.4.1 Military. In addition to any special marking specified in the contract or purchase order, marking shall be in accordance with MIL-STD-129.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The bridge is intended to be transported and launched by the M48A2, M48A5, or M60A1 launchers. The bridge is capable of carrying class 60 vehicle loads over a 60-foot gap.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
c. Whether bridge or bridge components are required (see 3.1).
d. Time frame required for submission of first article model (see 3.2).
e. When the Government will conduct any or all of the first article model examination and tests. When the Government will conduct some but not all of the first article examination and tests, the contracting officer should specify which examination and tests will be conducted by the Government and which examination and tests shall be conducted by the contractor (see 3.2).
f. When first article inspection is required and number of bridge(s) required (see 3.2).
g. When Government loaned property is not required (see 3.11).
h. Time frame required for submission of the first article pack (see 5.1).
i. Level of preservation and packing (see 5.2 and 5.3).
j. Quantity of components to be packed together (see 5.2.1.2).

6.3 First article. When a first article inspection is required, the item(s) should be a preproduction model. The first article should consist of one or more units. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of the first article test results and disposition of the first articles. Invitation for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4 Scissoring cylinder. Stipulation should be made in the contract that all hydraulic scissoring cylinders furnished in any given contract shall be fabricated by the same manufacturer.

6.5 Government-loaned property. The contracting officer should arrange to loan the inspection equipment specified in 3.11 and 4.1.3.

6.6 Quality assurance provisions (QAP). The contracting officer should require the contractor to maintain records of all QAP inspections. A suggested paragraph is as follows:

> "The contractor shall maintain complete records of all examinations and tests performed to verify the requirements of classified QAP characteristics. The records shall include, as a minimum, lot size, sample size, drawing requirement, actual measurement, number and type of deficiencies found, quantity approved, quantity rejected, corrective action taken when applicable."

6.7 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DIDs) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DIDs are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD Far Supplement 27.475-1 exempts the requirement for a DD Form 1423.

Reference paragraph	DID Number	DID Title
3.15.6.1	DI-MISC-80876	Welding Procedure Qualification Test Report
3.15.6.1	DI-MISC-80875	Welding Procedures

6.8 Definitions.

6.8.1 Quality assurance provisions (QAP). QAP's are the documented requirements, procedures, and criteria necessary for demonstrating that designs conform to user requirements and that materiel and associated services conform to approved designs. QAP's provide a quality baseline and the means of auditing the product to assure user satisfaction.

6.9 First article pack. Any changes or deviations of first article packs from the approved first article pack will be subject to the approval of the contracting officer. Approval of the first article pack will not relieve the

contractor of his obligation to preserve, pack, and mark the bridge or bridge components in accordance with this specification.

6.10 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

6.11 Subject term (key work) listing.

Armored-vehicle-launched bridge
Scissoring type bridge

Custodian:
Army - ME

Preparing activity:
Army - ME

Review activity
DLA - CS

Project 5420-0211

APPENDIX
FOR
BRIDGE, ARMORED-VEHICLE-LAUNCHED, SCISSORING-TYPE:
CLASS 60, ALUMINUM, 60-FOOT SPAN

10. SCOPE

10.1 Scope. This appendix is a riveting workmanship standard that contains riveting requirements and criteria for acceptance and rejection of rivets.

20. APPLICABLE DOCUMENTS.

MILITARY SPECIFICATION

MIL-R-12221	-	Rivets, Solid; Aluminum Alloy Grade 7277, Tempered.

30. REQUIREMENTS.

30.1 Rivets. Rivets shall conform to specification requirements shown on applicable drawings. Rivets shall not be heated in excess of 975 °F and shall be driven at a temperature of not less than 850 °F. Heating ovens shall be checked at start of each shift to insure that temperature indicators are correct. Heating ovens shall be placed as close to work as possible as delay from heater to work may cause cooling below the minimum temperature.

30.2 Rivet holes. Rivet hole diameters shall be within the limits specified on the drawings. Holes shall be perpendicular to the surface of the parts being joined. Depth of countersink for countersunk rivets shall be within ±.015 inch of the countersink height required in MIL-R-12221 for type 7 countersunk heat rivets. Wrong degree countersink not acceptable.

30.3 Riveting.

30.3.1 General. All rivets having the following defects shall be removed and replaced (see 30.4):

a. Loose rivets.
b. Clinched (bent over) rivets.
c. Rivets with a complete offset driven head.
d. Rivets with shank and head tangential.
e. Rivets with cracked heads (manufactured or driven) resulting from heating the rivet above the 975 °F level. These are the type of cracks shown in figure A-1. They are normally referred to as "hot-short" cracks, and usually occur at several locations around the periphery of the driven head,

Rivets shall be removed and replaced whenever more than one in a group of eight in a connection have the following defects:

a. Rivets with heads offset more than 20 percent of the rivet shank diameter.
b. Contact of the rivet head, manufactured or driven, is less than 80 percent of the periphery of the head or the rivet shank is exposed.
c. Radial "split-type" cracks, resulting from a longitudinal seam in the initial rivet wire, in either the manufactured or driven head (or both) are acceptable provided the cracks do not extend within a circle concentric with and having a diameter of approximately 1.2 times the shank diameter. These types of cracks are shown in figure A-2. They normally occur at only one location around the periphery of the manufactured or driven head or both. Where this type of crack occurs in both heads, as shown in figure A-2, the crack developed in the driven head is directly in line with the crack in the manufactured head.
d. Radial cracks resulting from the fact that the rivet material sometimes has only a limited capacity to withstand plastic deformation are acceptable under the following conditions:

(1) The cracks do not extend within a circle concentric with and having a diameter approximately 1.2 times the rivet diameter and
(2) if more than one crack is present, that no two cracks tend to intersect so as to be a potential cause of a section of the head chipping out. These types of cracks are shown in figure A-3. They are often referred to as "shear cracks", and usually occur in only the driven head. They are usually inclined at about 45 degrees to the surface of the plate (see figure A-3). No more than three "shear cracks" will be acceptable on a rivet head.

30.3.2 Cone point rivet heads. Driven cone point rivet heads shall have the minimum height and diameter dimensions specified on the drawings. Lop-sided driven heads on which the thinnest edge is not less than one-half the thickness of the thickest edge shall be acceptable provided that there is not more than one in a group of eight.

30.3.3 Countersunk rivet.

30.3.3.1 Manufactured heads. Manufactured heads may extend above, or below, the surrounding surface (edge of countersunk hole. i.e., not top of raised pattern) by an amount not exceeding .015 inch. Heads below the surrounding metal in excess of the .015 inch amount are not acceptable and shall be removed. Heads extending more than .015 inch above the surrounding surface shall be mechanically removed to meet the maximum .015 inch requirement.

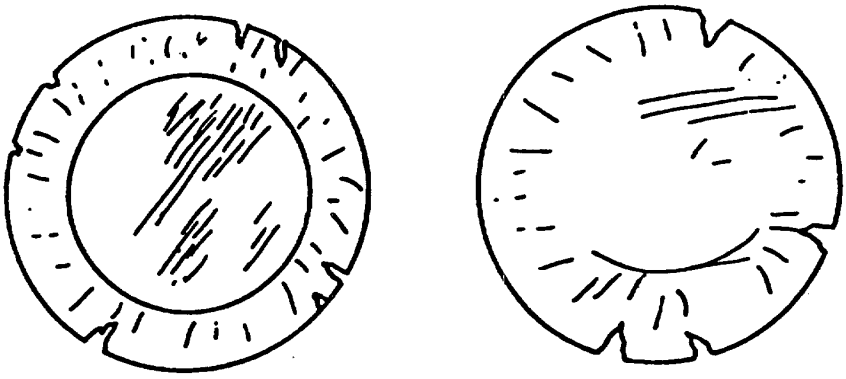
30.3.3.2 Driven heads. Driven countersunk heads shall completely fill the rivet hole, but may project above the surrounding surface by the same .015 inch amount permitted for the manufactured countersunk head. Heads extending more than .015 inch above the surrounding surface shall be mechanically removed to meet the maximum .015 inch requirement. The height of a driven head (1/2 inch button head rivet) shall not exceed the height of the raised

lugs on the ramp floor plate by more than .010 inch and the maximum gap at the greatest point of the gap under the manufactured button head shall not exceed 0.20 inch.

30.4 Repair methods. Loose rivets may not be tightened by redriving or caulking and shall be removed. Defective rivets shall be removed by mechanical methods and the following accomplished:

a. Inspect hole for conformance to drawing requirements. If hole is good, drive a new rivet to the same standards as the original rivet.
b. If the hole does not meet the drawing tolerance, or is not perpendicular to the surface of the parts being joined, it shall be reamed out to fit the next larger size rivet that will provide an acceptable hole. Maximum allowable diameter increase over specified rivet size is 1/8 inch.

TOP VIEW



BUTTON DRIVEN HEAD

CONE-POINT DRIVEN HEAD

SIDE VIEW

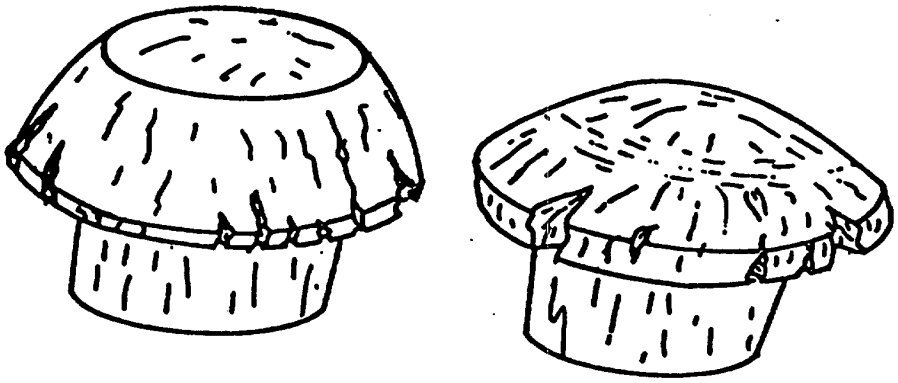
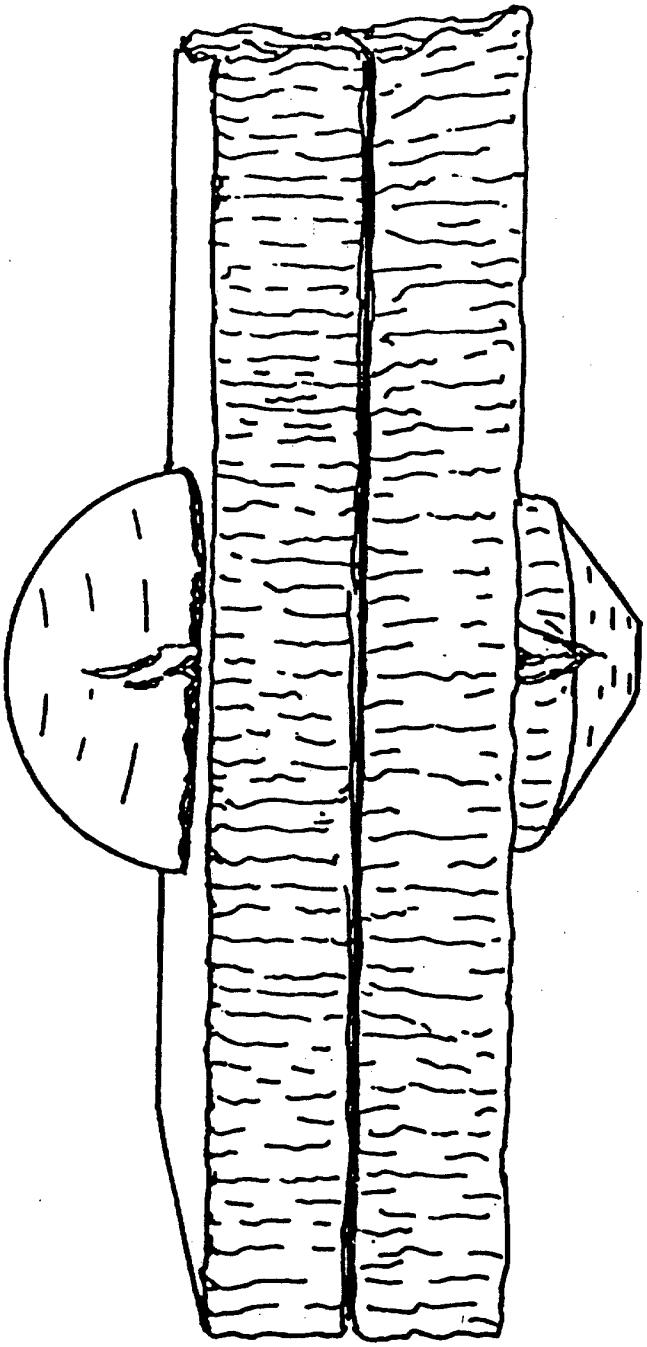


FIGURE A-1. Hot-short cracks in rivet heads developed during driving after heating at a temperature above the recomended temperature.

X-3340



X-3341

FIGURE A-2. Radial splitting cracks resulting from slight seams or other longitudinal defects in the rivet wire.

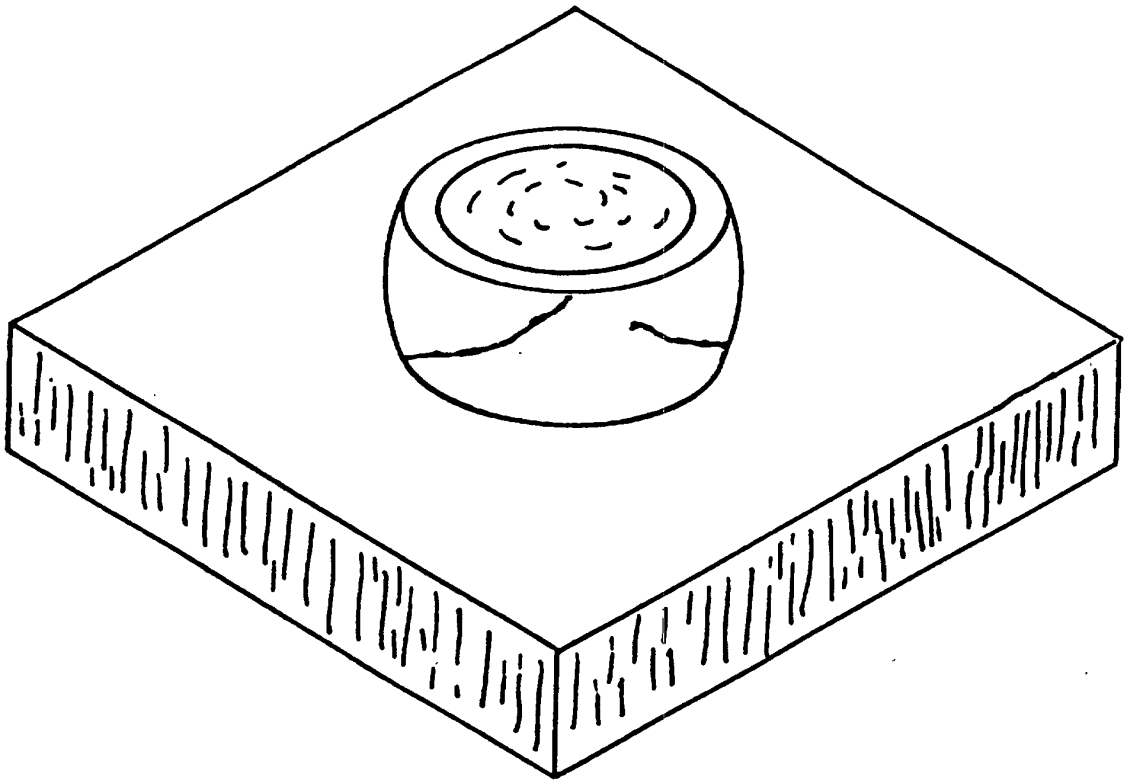


FIGURE A-3. Example of shear cracks in driven head of rivet driven with a flat head.

X-3342

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-B-52088F	2. DOCUMENT DATE (YYMMDD) 920403

3. DOCUMENT TITLE Bridge, Armored-Vehicle-Launched, Scissoring-Type: Class 60, Aluminum, 60 Foot Span

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (if applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME Gerry Harlow	b. TELEPHONE (Include Area Code) (1) Commercial (703) 704-3469 (2) AUTOVON 654-3469
c. ADDRESS (Include Zip Code US Army Belvoir RDE Center ATTN: STRBE-TSE Fort Belvoir, VA 22060-5606	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340

DD Form 1426, OCT 89 Previous editions are obsolete